the comments which follow.

Discussion of Borgwardt

Claims 1-12 and 27 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Borgwardt. The rejection of claims 1-12 and 27 in view of Borgwardt is respectfully traversed. An anticipation rejection requires that each and every element of the claimed invention as set forth in the claim be provided in the cited reference. See *Akamai Technologies Inc. v. Cable & Wireless Internet Services Inc.*, 68 USPQ2d 1186 (CA FC 2003), and cases cited therein. As discussed in detail below, Borgwardt does not meet the requirements for an anticipation rejection.

Borgwardt discloses a method for distributing video buffer rate control over a parallel compression architecture using a three pass algorithm for each picture within a group of pictures. The first pass parallel processors compute complexity measures for all the macroblocks in the entire picture so that a central rate controller knows them before encoding begins. In the second pass, the central rate controller divides up a target bit rate for the entire picture between slices of the picture to get an initial target bit rate for each slice based upon the complexities of the macroblocks. In a third pass, each slice is sent to a separate parallel processor for encoding (Col. 3, lines 3-14). In particular, a set of slices of each picture are transferred to parallel client processors for encoding the slices in parallel based on the slice target rates and quantization scale factors.

In contrast to Borgwardt, with Applicant's claimed invention, the video frame is represented by a plurality of panels. Each panel comprises a plurality of slices. Each of the panels is processed in parallel by a respective compression engine.

As discussed with the Examiner during a telephone interview on August 11, 2004, Borgwardt does not disclose or suggest processing panels of a video frame in parallel, as claimed in Applicant's invention. In Borgwardt, the video frame is divided into a number of slices. The slices in the set of slices are processed in parallel by parallel client processors. For example, with four client processors, slices 0-3 of a video frame would be processed first in parallel (i.e., one slice at each client processor), then the next set of slices of the video frame (i.e., slices 4-7) would be processed in parallel, and so on until the entire video frame has been processed (Col. 4, lines 15-17).

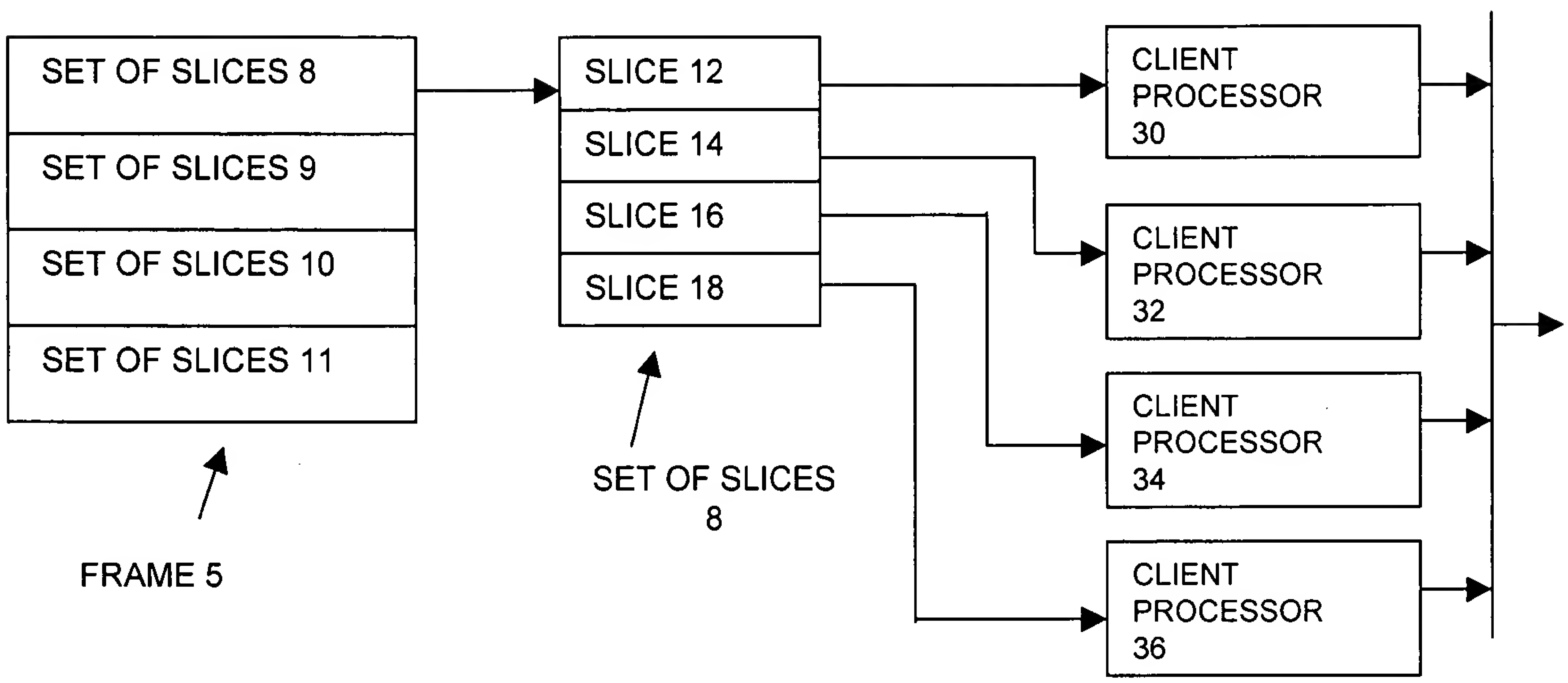
Therefore, Borgwardt discloses the processing of individual slices from a set of slices in parallel, and processing the sets of slices of a video frame in series. Accordingly, in Borgwardt, it takes several processing cycles to completely process a single frame, since only one set of slices is processed at a time.

In contrast, with Applicant's claimed invention, panels of the video frame, each of which contains a plurality of slices, are processed in parallel. Therefore, with Applicant's invention an entire frame can be processed in a single processing cycle.

Therefore, even assuming *arguendo* that Applicant's panel, which contains a plurality of slices, is equivalent to Borgwardt's set of slices, the processing of the set of slices disclosed in Borgwardt is substantially different than the processing of the panels as set forth in Applicant's claims. In particular, with Applicant's claimed invention it is the panels (sets of slices) which are processed in parallel. In contrast, with Borgwardt, it is the individual slices from the set that are processed in parallel.

The following Figure 1 illustrates an example of one processing cycle as disclosed in Borgwardt:

FIGURE 1: BORGWARDT - ILLUSTRATION OF ONE PROCESSING CYCLE

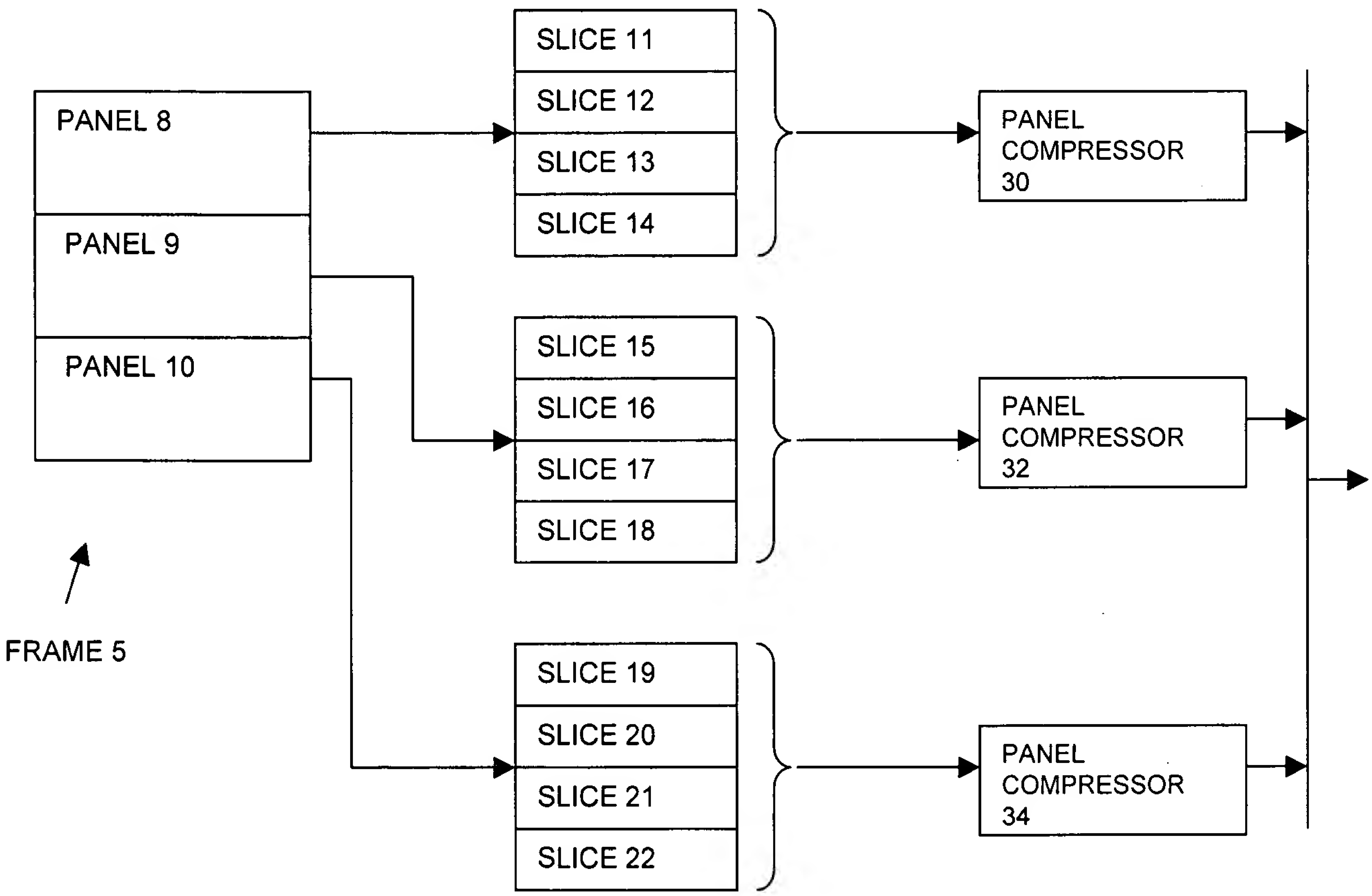


As is apparent from Figure 1 above, in Borgwardt, a frame 5 is divided into sets of slices 8, 9, 10, and 11. The first set of slices (set of slices 8) is processed first. Set of slices 8 contains slices 12, 14, 16, and 18. Each slice 12, 14, 16, and 18 from set of slices 8 is then processed in parallel by respective client processors 30, 32, 34, and 36. In other words, slice 12 is processed by processor 30, slice 14 is processed by processor 32, slice 16 is processed by processor 34, and slice 18 is processed by processor 36, all at the same time. Once the processing of all the slices of set of slices 8 takes place, a single processing cycle is complete. Then, the slices from the next set of slices 9 are processed in parallel by client processors 30, 32, 34, and 36, and so on until the frame is completely processed. Therefore, for the example shown in Figure 1 above, where the frame 5 is divided into 4 sets of slices 8, 9, 10, and 11, four separate processing cycles will take place before the frame is completely

processed.

Figure 2 below shows an example of one processing cycle which occurs with Applicant's claimed invention.

FIGURE 2: APPLICANT'S INVENTION - ILLUSTRATION OF ONE PROCESSING CYCLE



With Applicant's invention, the frame 5 is divided into a plurality of panels 8, 9, and 10. Each panel contains a plurality of slices. For example, panel 8 contains slices 11, 12, 13 and 14; panel 9 contains slices 15, 16, 17, and 18; and panel 10 contains slices 19, 20, 21, and 22. Each panel 8, 9, and 10 is then processed in parallel by panel compressors 30, 32, and 34 respectively. In other words, panel 8 (with slices 11, 12, 13, and 14) is processed by panel compressor 30; panel 9 (with slices

15, 16, 17, and 18) is processed by panel compressor 32; and panel 10 (with slices 19, 20, 21, and 22) is processed by panel processor 34, all at the same time in a single processing cycle. Accordingly, with Applicant's claimed invention, the entire frame 5 is processed in a single processing cycle.

As is apparent from comparing Figures 1 and 2, Applicant's claimed invention processes panels (sets of slices) in parallel, while Borgwardt processes individual slices in parallel and processes the sets of slices of the frame in series. Further, with Applicant's invention, the entire frame 5 may be processed in a single processing cycle, while in Borgwardt, multiple processing cycles are needed to completely process a frame.

Borgwardt does not disclose or remotely suggest parallel processing of panels of a video frame, as claimed by Applicant.

Further, Borgwardt does not disclose or suggest that the quantization level used for encoding the last slice of each panel is driven toward the target quantization level, as claimed by Applicant. In Borgwardt, once the encoding of each slice is completed at a client processor, the statistics for the slice, which include the actual rate or number of bits used and the actual quantizer scale factors, are returned to the master rate controller, together with the statistics from the other client processors. These actual statistics from the completed slices are used by the master rate controller to update the target rates and quantizer scale factors for the next set of slices to be passed to the client processors. This process continues until all slices of the frame have been encoded (Col. 4, lines 25-36). Therefore, in Borgwardt, the quantizer scale factor is updated after each set of slices is processed.

In contrast, with the present invention as set forth in claims 1 and 27, the first slice of each panel is encoded in accordance with the target quantization level. Subsequent slices in each panel are encoded with a quantization level that is

allowed to vary from the target quantization level until the last slice of each panel is reached. The last slice of each panel is encoded using a quantization level that is driven toward the target quantization level. This process avoids visible artifacts caused by abrupt changes in the quantizer scale at panel boundaries. As the quantization scale value used to encode the last slice of each panel is driven closer to the target quantization level used to encode the first slice of each panel, the panel boundary becomes less and less visible.

Since Borgwardt updates the quantizer scale factors after each set of slices is encoded, and continues to update the quantizer scale factors after set of slices is encoded, Borgwardt does not drive the quantization level of the last slice in each set of slices to the target quantization level, as claimed by Applicant. In fact, by continuously updating the quantization level after each set of slices is processed, Borgwardt teaches away from Applicant's claimed invention.

In sum, Borgwardt does not disclose the subject matter of Applicant's independent claims. For example, Borgwardt does not disclose or remotely suggest dividing a video frame into a plurality of panels, each of which has a plurality of slices, and each panel is processed in parallel by a respective compression engine. Further, Borgwardt does not disclose or remotely suggest encoding the first slice of each panel in accordance with the target quantization level, and driving the quantization level used to encode the last slice of each of the image panels toward the target quantization level used to encode the first slice of each panel, while allowing the quantization level used to encode slices of each panel between the first and last slice to vary from said target quantization level, as set forth in Applicant's claims 1 and 27.

As Borgwardt does not disclose each and every element of the invention as claimed in claims 1-12 and 27, the rejections under